



Original Communication

Retrospective study on suicidal cases by sharp force injuries

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Abstract

A total of 65 suicidal cases due to sharp force injuries (cut and/or stab wounds) were investigated. Suicide by sharp force injuries accounted for 2.5% of all suicides in our prefecture during 1995–2005. The 65 victims were composed of 49 males and 16 females, and the age range of 50–70 years was most common. A history of psychiatric disease was found in 11 victims, and depression was the most common disease followed by schizophrenia. Of 65 cases, 8 victims had a history of previously attempting suicide. In 41 cases, a suicide note or will was found. Forty-six cases had pleural sharp force injuries. Interestingly, the remaining 19 deaths were due to a single sharp injury. Cutting injuries were predominantly located at the flexor side of the wrist (11 cases, 38%), followed by the neck (10 cases, 34%). On the other hand, stab wounds were most commonly located in the chest (17 cases, 49%). Tentative wounds, which were superficial cut wounds or stab wounds, were present in 37 cases (57%). In 27 of 37, hesitation marks were observed in close proximity. Tentative wounds more frequently appeared in cut injuries than in stab injuries. Of 28 cases with fatal cut or stab wounds localized in the trunk, 11 cases (39%) had clothing damage. In the discrimination between suicide and homicide, forensic pathologists should obtain information on victims and witnesses as well as investigating the scene and postmortem examination of the victim.

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1. Introduction

The increase of suicide cases is a serious social problem in Japan. Cutting or stabbing is an uncommon method of suicide. Several lines of accumulating evidence demonstrated that the ratio of suicide by sharp force injuries to total suicidal cases was 2–3%.^{1–4} Moreover, Bajanowski et al.⁵ reported that the ratio of homicides to suicides by sharp weapon injury was 5:2. When forensic pathologists encounter cases of fatal sharp force injury, they are required to differentiate suicide from homicide based on the injury type, its location, and scene investigation by police. Classically, typical suicidal cases by sharp force injuries are associated with three of the

following from the viewpoint of forensic pathology: (1) several (not multiple) injuries are observed at the possible site of self-infliction; (2) tentative wounds are present; (3) clothing damage(s) is absent. Thus, these three aspects can contribute to the discrimination of suicide by cutting or stabbing from homicide. However, several lines of accumulating evidence have reported suicidal cases with such unusual findings as multiple self-inflicted injuries, a single stab wound, no hesitation marks, or clothing injuries, which do not agree with the classical criteria as mentioned above.^{6–9} According to the previous study, Kondo and Ohshima¹⁰ mentioned that a psychiatric history with or without medical treatment was sometimes found in atypical suicidal cases, and suggested the importance of investigating the medical history of each victim as well as medico-legal inspection and/or autopsy.

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In the present study, we retrospectively investigated suicides by fatal sharp force injuries, and discussed the medico-legal aspects of the differentiation between suicide and homicide.

2. Materials and methods

We investigated all inquest records collected between 1995 and 2005 in cooperation with the First Department of Criminal Investigation of Wakayama Prefectural Police Headquarters. The suicide-related records were carefully assessed by inquest doctors and were additionally confirmed by other medical doctors in our group. During 1995–2005, there were 2556 suicides in Wakayama Prefecture, among which, 65 cases (2.5%) were committed by sharp weapons. In each case, the victim's details, including gender, age, psychiatric history, total number and localization of sharp force injuries, presence of hesitation marks and clothing injuries, and toxicological data were reviewed.

3. Results

3.1. Case profile

Among 65 suicides by sharp weapon injury, 49 were male, and the remaining 16 were female (Fig. 1). Their ages ranged from 18 to 86 years, and 36 (55%) were 50–70 years of age. A history of psychiatric disease was found in 11 victims (17%), in whom depression was the most common disease followed by schizophrenia. Of 65 cases, 8 had a history of previous attempted suicide. In 41 cases (63%), a suicide note or will was found. Concerning location (Table 1), 39 (60%) committed suicide at home: the bedroom (14 cases) was the most frequent location, followed by the bathroom (8 cases), and then the living room (5 cases). Forty-eight victims (74%) lived with their family. Knives with a single blade were the most common implement, followed by cutters (Table 2).

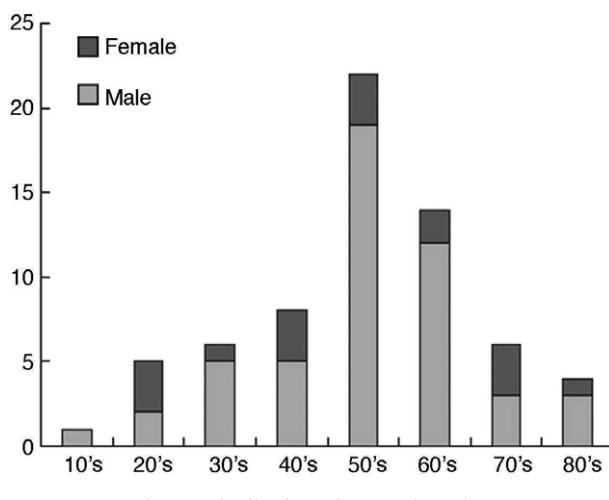


Fig. 1. Distribution of age and gender.

Table 1
Thirty-nine suicides committed at home

Location	Case
Bedroom	14
Bathroom	8
Living room	5
Garden	2
Others	10

Table 2
Implement used in each case

Implement	Case
Knife	43
Cutter	11
Razor	6
Others	5

3.2. Number, type and localization of sharp weapon injury

The total number of sharp force injuries is shown in Table 3. In accordance with classical criteria, 46 cases (71%) had plural sharp force injuries. Interestingly, the remaining 19 cases (29%) had a single sharp injury (cut wound or stab wound), among which, 8 were cut wounds and 11 were stab wounds. Moreover, in 10 of the 19 cases, the lethal sharp weapon injury was on the left side of the chest.

We reviewed the types of sharp weapon injury. Cut wounds and stab wounds were 29 and 36 cases, respectively (Table 4). The wound type was not able to be determined in only one case because of advanced postmortem changes. As shown in Table 4, cutting injuries were predominantly located on the flexor side of the wrist (11 cases, 38%), followed by the neck (10 cases, 34%). On the other hand, stab wounds were most commonly located in the chest (17 cases, 49%), followed by the abdomen.

3.3. Hesitation marks and clothing damage

Tentative wounds, superficial cut wounds or stab wounds, were present in 37 cases (57%) (Table 5). In 27 of 37, such wounds were observed in close proximity. They appear more frequent in cut injuries than in stab injuries. Of 28 cases of fatal cut wounds or stab wounds localized on the trunk, 11 cases (39%) had clothing damage (Table 6).

Table 3
Total number of sharp force injuries

Total number	Case
1	19
2–10	36
>10	7
>30	2
Unknown	1
Total	65

Table 4
Type and location of sharp force injuries

	Head	Neck	Chest	Abdomen	Forearm		Wrist		Lower extremity	Multi	Unknown	Total
					Right	Left	Right	Left				
Cutting		10 (33%)	1 (3%)	1 (3%)	2 (7%)	2 (7%)	2 (7%)	9 (33%)	1 (3%)	1 (3%)		29
Stabbing	1 (3%)	10 (20%)	17 (50%)	7 (23%)								35
Unknown										1	1	1
Total	1	20	18	8	2	2	2	9	1	1	1	65

Table 5
Hesitation marks

	Present	Absent	Unknown	Total
Cuts	18	11		29
Stabs	19	16		35
Unknown		1		1
Total	37	27	1	65

Table 6
Clothing damage

	Present	Absent	Total
Cuts	1	1	2
Stabs	10	16	26
Total	11	17	28

4. Discussion

It is needless to say that differentiating between suicide and homicide is one of the most important issues in forensic practice. In general, hanging is the most common method of committing suicide. When forensic pathologists encounter fatal cases due to sharp weapon injury, they should be careful to differentiate between suicide and homicide because unusual suicide cases have been reported.⁶ Thus, we performed a retrospective study on suicide cases due to sharp force injuries, and compared our results with previous reports.

Age distribution in the present study was almost in accordance with previous studies. Also in line with previous studies,^{1,11–14} suicides by cutting or stabbing were more prevalent in men than women. Psychiatric disorders were often found in victims committing suicide by sharp force, and several lines of accumulating evidence have demonstrated that mental disorders were established in 60% of cases examined^{11,14}; however, our investigation showed a lower incidence of mental disorders compared with previous reports.

It is important to record the sites of cut and/or stab wounds, since the localization of sharp force injuries can contribute to discriminate suicide from homicide. Generally, in suicidal cases, cut and/or stab wounds are usually found at anatomically possible sites of self-infliction, whereas sharp force injuries to the back of a victim strongly indicate homicide. Several lines of accumulating evidence

have shown that self-inflicted cut wounds are usually found to the neck or wrist.^{11,14} The most frequent site of stabbing is the left side of the chest, where the victim believes the heart to be positioned, or in the upper abdomen, where the victim may be reasonably sure that there is nothing in the way, such as a rib, that would prevent entry into vital organs.^{11,13–15} Moreover, several independent groups have reported unusual cases in which stab wounds were found to the head or throat.^{16–21} In our series, a 61-year-old male was found lying on his back, with a knife in the rear of his head near the mastoid process. Moreover, forensic pathologists have to take account of the victim's handedness. It is easy to accept no wounds to the right arm and/or hand when the victim is right-handed. In our series, there was no contradiction between wound sites and the victim's handedness; however, Fukumoto²² reported a suicidal case in which, although the victim was right-handed, self-inflicted cut wounds were found on his right palm.

In accordance with previous studies,^{3,11–14} the number of sharp force injuries varied in our series. In several series,^{3,7,11,12,14} cases with more than 60 sharp force injuries were involved. To the best of our knowledge, Karger and Vennemann²³ reported an extremely unusual suicide case with more than 90 stab wounds, including perforation of the skull. On the other hand, suicide cases by a single stab wound were reported.^{24,25} In such single stabbing cases, forensic pathologists must very carefully examine whether the stab wound has only one wound tract or more. The total number of injuries is, therefore, a less reliable parameter for the distinction between suicide and homicide.

Tentative marks are believed to be the most useful indication in distinguishing suicide from homicide. According to several investigations, hesitation marks are observed in most cases of suicide (>70%) from sharp weapon injury^{1,11,12,14,26,27}; however, Byard's¹³ and the present series showed a lower incidence of hesitation marks. Hesitation marks are usually seen in close proximity to fatal injuries; however, Kurihara et al.²⁸ reported a case of suicide by drowning with hesitation marks on the back, and the authors of this paper also observed several hesitation marks on the posterior region of the neck in a case of suicide by jumping from a height after inhalation of thinner.^{29,30} Moreover, forensic pathologists should be aware that hesitation marks have also been found in homicidal cases.³¹

In the general manner of suicide, cut or stab wounds are usually sustained at sites not covered by clothing, or at sites

exposed after the clothing is pulled up. Actually, Karlsson et al.¹ reported that the clothing was damaged in only 4 of 89 suicides by sharp injury. Start et al.¹¹ observed this finding in 8 of 28 suicides by stabbing; thus, clothing damage by sharp force is interpreted as an indication of homicide¹; however, in the present study, clothing damage was observed in 11 (39%) of 28 cases where fatal injuries were located on the trunk covered with clothing. Similarly, in suicide cases with stab injuries to the trunk, the frequency of clothing damage was more than 50%.¹⁴ Collectively, clothing damage does not indicate homicide.

Estimating the potential for physical activity after fatal injury is necessary to reconstruct each event.^{32,33} In courts, questions concerning the physical activity of the victim after fatal injuries are often raised in homicide. Based on the scene investigation by police, eight victims moved away from the site where they cut or stabbed themselves in the present study. Zimmer et al.³⁴ reported a case in which a 25-year-old man with a single heart wound was able to run about 100 m. In a case reported by Shiono and Takae,³⁵ a 44-year-old man stabbed himself in the heart with a kitchen knife and died from cardiac tamponade 2 h later. Surprisingly, in the interim, he had changed his clothes because they were stained with blood and eaten lunch with his aunt.

Finally, in the present study, some features, which seemed atypical, were extracted for suicides due to sharp force injury. Thus, in the discrimination between suicide and homicide, forensic pathologists should obtain information about victims and witnesses as well as investigating the scene and postmortem examination of the victim. In the future, to differentiate between suicide and homicide, forensic pathologists should try to establish multivariate analysis, so-called forensicmetrics, as suggested by Karlsson.³⁶

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